

REMARKS

This application has been reviewed in light of the final Office Action dated September 22, 2006. Favorable reconsideration and withdrawal of the rejections set forth in the Office Action are respectfully requested in view of the following remarks.

Status of the Claims

Claims 10-22 are pending. Claims 10, 18, 21 and 22 are in independent form.

Rejections

Claims 10-16 and 18-22 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,493,109 (Takamura et al.). Claim 17 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Takamura et al. in view of U.S. Patent No. 5,539,433 (Kawai et al.). These rejections are respectfully traversed for the following reasons.

Response to Rejections

Independent Claim 10 recites, *inter alia*, (1) a printhead substrate having an ink supply opening, (2) an array of printing elements provided along the ink supply opening and divided into a plurality of groups of printing elements, and (3) an array of driving circuits provided along the ink supply opening and arranged to correspond to the printing elements, respectively, for driving the corresponding printing elements, respectively, (4) a selection circuit common to the plurality of groups of printing elements of the array for selecting a printing element to be driven in each group, (5) that the data supply means comprises a plurality of shift registers, (6) that the plurality of shift registers are provided at both longitudinal ends of the ink supply opening, and (7) that

each shift register is arranged to supply driving data to one or more of the driving circuits for driving the corresponding printing elements, of the plurality of groups of printing elements, which are closer than non-corresponding printing elements to the shift register. Each of independent Claims 18, 21 and 22 (directed to a print head, a print head cartridge, and a printing apparatus, respectively) recites features similar or identical to these features recited in Claim 10. One non-limiting example of this structure is shown in Figures 1, 13, 14, and 15.

By this arrangement, where the ink supply opening and the print head assembly are elongated as shown in Figures 13 and 15, there is no need for a long and winding wiring for transferring a print signal, e.g., extending from one end on a print head substrate where data supply means is provided to the other end where (a portion of the) printing elements are provided. Such a long and winding wiring is not required because of the use of a selection circuit common to the plurality of groups of printing elements, and a plurality of shift registers at both longitudinal ends of the ink supply opening, where each shift register is arranged to supply driving data to one or more of the driving circuits for driving the corresponding printing elements, of the plurality of groups of printing elements, which are closer than non-corresponding printing elements to the shift register. The absence of a long and winding wiring for transferring a print signal contributes significantly to downsizing the area required for wiring, and thus to reducing the size of the substrate.

In addition, since common signal lines are provided for each of the plurality of groups of printing elements, with print element selection signals being supplied via the common signal lines, it is possible to realize unified driving timing control over the groups.

To reject a claim as being anticipated by a reference, MPEP § 2131 places the burden on the Patent Office to cite art showing “each and every element as set forth in the claim”. But in

this case, the portions of the reference (Takamura et al.) cited by the Office Action are not understood to show the claimed an ink supply opening of a print head substrate, an array of printing elements provided along the ink supply opening, and the claimed positional relationship between the ink supply opening and the shift registers. Therefore, for these reasons, the Office is not understood to have satisfied its burden of proof to establish anticipation of independent Claims 10, 18, 21 and 22 over Takamura et al.

- A. The Office is not understood to have satisfied its burden of proof to establish that Takamura et al. shows an ink supply opening of a print head substrate

Page 3 of the Office Action cites column 8, lines 33-44 of the Takamura et al. patent to show the claimed ink supply opening. But this portion of this patent is understood to merely show an arrangement of output pins, and is not understood to disclose or suggest an ink supply opening or an array of printing elements provided along the ink supply opening, as recited by Claim 10:

In this apparatus, there are provided output pins D01 to DOn outputting drive waveforms for driving a print head (not shown) in which n output devices (such as an LED (light emitting device), a heat emitting device and ink containers for an inkjet head), and a driving waveform forming circuit 541 selecting a driving waveform based on the printing data by the n-bit latch 531 using the latch signal (LT) inputted through the LT terminal from the printing data number control circuit 561. The driving signal selected by the driving waveform forming circuit 541 is outputted to the buffers 5511 to 551n, which output driving waveforms to the corresponding output pins D01 to DOn, respectively.

Moreover, nothing elsewhere in Takamura et al. is understood to teach or suggest the positional arrangement of the printing elements with respect to an ink supply opening, as recited in independent Claim 10. Thus, the Office Action is not understood to have established that the

Takamura et al. patent discloses the claimed ink supply opening or an array of printing elements provided along the ink supply opening, as recited by Claim 10. Therefore, for this reason, Applicant submits that the Office has failed to establish anticipation of Claim 10 over the Takamura et al. patent and respectfully requests that the rejection of Claim 10 be withdrawn. And since Claims 18, 21, and 22 are corresponding print-head, print-head-cartridge, and printing-apparatus claims, they are allowable for corresponding reasons.

- B. The Office has not satisfied its burden of proof to establish that
Takamura et al. shows an array of printing elements provided
along an ink supply opening of a print head substrate

Page 3 of the Office Action cites Figure 17 and elements “55(11 ~1n, 21 ~2n”), (D01 ~D0n)” of the Takamura et al. patent to show the claimed array of printing elements. But these elements are merely understood to relate to buffers, as discussed at column 8, lines 43 and 44: “The driving signal selected by the driving waveform forming circuit 541 is outputted to the buffers 5511 to 551n, which output driving waveforms to the corresponding output pins DO1 to DOn, respectively.”. In addition, the corresponding drawing (e.g. Fig. 17) is also understood to indicate such buffers, which are designated as 55₁₁ ~55_{1n}, 55₂₁ ~55_{2n}. Accordingly, the elements referred to as 55₁₁-55_{1n} and 5511 to 551n are never understood to perform a printing operation. Thus, the Office Action is not understood to have established that the Takamura et al. patent discloses the claimed array of printing elements. And since these portions of the Takamura et al. patent are not understood to disclose or suggest the claimed array of printing elements, these portions of Takamura et al. patent are also not understood to disclose or suggest an array of printing elements provided along the ink supply opening, as recited by Claim 10. In addition, it noted that Fig. 17 is a “circuit block diagram” (col. 3, line 23; emphasis added) and hence does

not indicate the physical arrangement of the elements depicted therein. Moreover, nothing elsewhere in Takamura et al. is understood to teach or suggest an array of printing elements provided along the ink supply opening, as recited by Claim 10. Therefore, for this additional reason, Applicant respectfully submits that the Office has failed to establish anticipation of Claim 10 over the Takamura et al. patent and respectfully requests that the rejection of Claim 10 be withdrawn. And since Claims 18, 21, and 22 are corresponding print-head, print-head-cartridge, and printing-apparatus claims, they are allowable for corresponding reasons.

- C. The Office has not satisfied its burden of proof to establish that
Takamura et al. shows a plurality of shift registers
provided at both longitudinal ends of an ink supply opening

Page 4 of the Office Action cites Figure 17 of the patent to Takamura et al. to show a plurality of shift registers (which the Office Action identifies as elements 521 and 522), provided at both longitudinal ends of an ink supply opening. But, as noted above, since the Office Action has not identified any element that corresponds to the claimed ink supply opening and does not identify the element in Figure 17 corresponding to the claimed ink supply opening, Applicant submits that the Office has not satisfied its burden of proof to establish that the Takamura et al. patent discloses a plurality of shift registers provided at both longitudinal ends of an ink supply opening, as recited by Claim 10. Moreover, nothing in elsewhere in Takamura et al. is understood to teach or suggest the positional arrangement of the shift registers (a) with respect to the ink supply opening or (b) with respect to driving circuits for driving corresponding printing elements, which are relatively closer to the shift register, as recited in independent Claim 10. In addition, as noted, Fig. 17 is a circuit block diagram and hence does not indicate the physical arrangement of the elements depicted therein. Thus, even if Fig. 17 be deemed to

illustrate shift registers, driving circuits, and/or printing elements, it indicates merely the circuit or electrical connections between these elements and not the physical layout thereof or the positional relationships therebetween. It is further noted that all of the figures in Takamura et al. are either circuit block diagrams or signal timing charts, and hence none of those figures indicates any physical layout of elements or positional relationships between elements. Therefore, for these additional reasons, Applicant submits that the Office has failed to establish anticipation of Claim 10 over the Takamura et al. patent and respectfully requests that the rejection of Claim 10 be withdrawn. And since Claims 18, 21, and 22 are corresponding print-head, print-head-cartridge, and printing-apparatus claims, they are allowable for corresponding reasons.

Conclusion

The other claims in this application are each dependent from one or another of the independent claims discussed above and are therefore believed patentable for the same reasons. Since each dependent claim is also deemed to define an additional aspect of the invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our Washington office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below listed address.

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